

Claims

What is claimed is:

1 1. A method of dividing up a communication channel for use in a seismic
2 acquisition system having M base stations and N sensors, comprising:
3 dividing up the communication channel into M frequency bands; and
4 dividing up each frequency band into N+1 time slots.

1 2. A method of dividing up a communication channel for use in a seismic
2 acquisition system, comprising:
3 dividing up the communication channel into time slots including
4 signaling and status bits, seismic information, and guard time.

1 3. A method of transmitting information from a sensor to a base station
2 in a seismic acquisition system, comprising:
3 listening for an open time slot, frequency, and sector;
4 requesting use of the available time slot from the base station;
5 if the base station is operating at full capacity, then reducing the
6 overall data for the base station; and
7 if the base station is not operating at full capacity, then capturing the
8 open time slot and transmitting to the base station.

1 4. A method of error correction in a communication system for a seismic
2 acquisition system including a sensor and a base station, comprising:
3 transmitting data from the sensor to the base station ; and
4 if the data includes errors, then retransmitting the data.

1 5. A method of error correction in a communication system for a seismic
2 acquisition system including a sensor and a base station, comprising:

3 transmitting data from the sensor to the base station; and
4 if the data includes errors, then requesting retransmission of the data.

1 6. A method of error correction in a communication system for a seismic
2 acquisition system including a sensor and a base station, comprising:
3 transmitting data from the sensor to the base station;
4 if the data includes errors, then retransmitting during non-active time.

1 7. A method of transmitting information in a communication channel in a
2 seismic acquisition system including a plurality of sensors positioned at
3 different distance from a base station, comprising:
4 transmitting information from one of the sensors to the base station;
5 if the sensor is a nearby sensor, then adjusting the modulation in the
6 communication channel to increase the data density.

1 8. A method of transmitting information from a sensor to a base station
2 in a seismic acquisition system having a plurality of communication
3 channels, comprising:
4 selecting a channel for transmission from the sensor to the base
5 station;
6 if no channels are available, then waiting until a channel is available;
7 if the selected channel is available, then transmitting the information
8 from the sensor to the base station;
9 if the selected channel is impaired, then selecting another channel;
10 if all of the information has not been properly transmitted, then
11 adjusting to a lower order modulation and transmitting a
12 request for retransmission from the base station to the sensor;
13 and

14 if all of the information has been properly transmitted, then adjusting
 15 to a lower order modulation and transmitting control
 16 information from the base station to the sensor.

1 9. A base station for use in a seismic acquisition system, comprising:
 2 a transceiver;
 3 one or more diversity antennas; and
 4 one or more directional antennas.

1 10. A method of selecting an antenna for transmitting information in a
 2 seismic acquisition system having a plurality of antennas, comprising:
 3 determining the data density for each antenna;
 4 selecting the optimum antenna for transmitting information;
 5 transmitting the information using the selected optimum antenna; and
 6 subsequently receiving information using the selected optimum
 7 antenna.

1 11. A seismic acquisition system, comprising:
 2 one or more sensors adapted to sense conditions and generate signals
 3 representative of the sensed conditions including a memory for
 4 storing the signals;
 5 a base station operably coupled to the sensors for receiving and
 6 transmitting the signals including a memory for storing the
 7 signals; and
 8 a recorder operably coupled to the base station for storing the signals.

1 12. A method of communicating in a seismic acquisition system having
 2 sensors, base stations and a recorder, comprising:
 3 storing data in the sensors;

4 transmitting data from the sensors to the base stations;
5 storing data in the base stations; and
6 transmitting data from the base stations to the recorder.

1 13. A seismic acquisition system, comprising:
2 one or more sensors adapted to sense conditions and transmit signals
3 representative of the sensed conditions;
4 one or more base stations operably coupled to the sensors adapted to
5 receive and transmit the signals; and
6 a recorder operably coupled to the sensors and the base stations
7 adapted to receive the signals and transmit control information
8 to the sensors.

1 14. A seismic acquisition system, comprising:
2 a plurality of rows of sensor stations for sensing conditions and
3 transmitting signals representative of the sensed conditions;
4 a plurality of base stations coupled to the rows of sensor stations for
5 receiving and transmitting the signals; and
6 a recorder operably coupled to the base stations for receiving the
7 signals.

1 15. A wireless master sensor station, comprising:
2 a transceiver for transmitting and receiving information including a
3 directional antenna;
4 a control module coupled to the transceiver for monitoring and
5 controlling the operation of the wireless master sensor station;
6 and
7 a sensor module coupled to the control module for sensing conditions
8 and generating signals representative of the sensed conditions.

1 16. A sensor assembly, comprising:
2 a wireless master sensor station, including:
3 a transceiver for transmitting and receiving information
4 including a directional antenna;
5 a control module coupled to the transceiver for monitoring and
6 controlling the operation of the wireless master sensor
7 station; and
8 a sensor module coupled to the control module for sensing
9 conditions and generating signals representative of the
10 sensed conditions; and
11 one or more slave sensor stations operably coupled to the wireless
12 master sensor station, including:
13 a sensor module sensing conditions and generating
14 signals representative of the sensed conditions.

1 17. A twisted pair sensor station, comprising:
2 a sensor coupling module for coupling the sensor station to a wireline
3 connection;
4 a control module coupled to the sensor coupling module for monitoring
5 and controlling the operation of the sensor station; and
6 a sensor module coupled to the control module for sensing conditions
7 and generating signals representative of the sensed conditions.

1 18. A sensor assembly, comprising:
2 a plurality of twisted pair sensor stations operably coupled to one
3 another, each twisted pair sensor station including:
4 a sensor coupling module for coupling the sensor station to a
5 wireline connection;

6 a control module coupled to the sensor coupling module for
7 monitoring and controlling the operation of the sensor
8 station; and
9 a sensor module coupled to the control module for sensing
10 conditions and generating signals representative of the
11 sensed conditions.

1 19. A picocell base station, including:
2 a first cellular transceiver including a first antenna;
3 a second cellular transceiver including a second antenna;
4 a third cellular transceiver including a third antenna;
5 a radio transceiver including a radio antenna;
6 a control module coupled to the first, second and third cellular
7 transceivers and the radio transceiver;
8 a first wireline interface coupled to the control module;
9 a second wireline interface coupled to the control module; and
10 a third wireline interface coupled to the control module.

1 20. A picocell, including:
2 a first group of wireless master sensor stations adapted to collect and
3 transmit data;
4 a second group of wireless master sensor stations adapted to collect
5 and transmit data; and
6 a picocell base station coupled to the first and second group of wireless
7 master sensor stations adapted to receive the data from the
8 wireless master sensor stations and transmit it to an external
9 device.

1 21. A seismic acquisition system, comprising:
2 a plurality of rows of picocells, each picocell adapted to collect and
3 transmit data; and
4 a controller coupled to the picocells adapted to control and monitor the
5 picocells and receive data from the picocells.

1 22. A method of communicating information between a base station and a
2 plurality of sensors in a seismic acquisition system, comprising:
3 dividing the sensors into first and second groups of sensors;
4 transmitting information from the base station to the first group of
5 sensors using a first communication channel;
6 transmitting information from the base station to the second groups of
7 sensors using a second communication channel; and
8 transmitting information from the base station to the first and second
9 groups of sensors using a third communication channel.

1 23. A method of transmitting packets of information from sensors to a base
2 station in a seismic acquisition system using a communication channel,
3 comprising:
4 dividing the communication channel into a plurality of time slots
5 including time slots for each of the sensors;
6 wherein each sensor time slot includes time slots for transmission of
7 the sensor identification, the sensor status, the information
8 packet number, the information, and error detection information
9 for the transmitted information.

1 24. A seismic acquisition system, comprising:
2 a plurality of rows of picocells for collecting and transmitting data;
3 a plurality of multiplexers coupled to the rows of picocells; and

4 a controller coupled to the multiplexers and the picocells for recording
5 the data, and monitoring and controlling the picocells.

1 25. A seismic acquisition system, comprising:
2 a first pico cell for collecting and transmitting data;
3 a second pico cell for collecting and transmitting data;
4 a multiplexer coupled to the first and second pico cells; and
5 a controller coupled to the first and second pico cells and the
6 multiplexer for monitoring and controlling the picocells and
7 collecting and recording the data.

1 26. A seismic acquisition system, comprising:
2 a plurality of pico cells having data storage; and
3 a controller coupled to the pico cells.
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